short, when vegetation has arrived at its proper period the crop is found far beyond that of the same plants grown in pure air; and, weight for weight, they contain twice as much azote. Besides these general effects there are others which are more variable, which depend upon particular conditions, but which are equally worthy of interest. In fact, by means of ammonia we can not only stimulate vegetation, but, further, we can modify its course, delay the action of certain functions, or enlarge the development and the modification of certain organs. The author further remarks, that if its use be ill-directed, it may cause accidents. Those which have occurred in the course of his experiments appear to him to throw an unexpected light upon the mechanism of the nutrition of plants. They have at least taught him at the expense of what care ammonia may become an auxiliary of vegetation. These experiments, which were made under the same conditions as those upon the absorption of azote, are then described, and their numerical results given.

To the conclusions already stated, the author adds that there are periods to be selected for the employment of ammonia, during which this gas produces different effects. If we commence its use when several months intervene before the flowering season of the plants, it produces no disturbance; they follow the ordinary course of their vegetation. If its use be commenced at the time of flowering, this function is stopped or delayed. The plant covers itself with leaves, and if the flowering takes place all the flowers are barren.

3. "An Account of Meteorological Observations in four Balloon Ascents made under the direction of the Kew Observatory Committee of the British Association." By John Welsh, Esq. Communicated by Colonel Sabine, R.A., Treas., V.P.R.S., President of the British Association, on the part of the Council of the Association. Received April 27th, 1853.

The object contemplated by the Kew Committee in the balloon ascents, of which an account is given in this communication, was chiefly the investigation of the variations of temperature and humidity due to elevation above the earth's surface. Specimens of the air at different heights were also obtained for analysis.

The instruments employed were the barometer, dry- and wet-bulb hygrometer, and Regnault's condensing hygrometer.

The barometer was a siphon, on Gay-Lussac's construction, without verniers; the upper branch of the siphon being alone observed, corrections having been previously determined for inequality of the tube at different heights of the mercury.

Two pairs of dry and wet thermometers were used, one pair having their bulbs protected from radiation by double conical shades open at top and bottom for the circulation of the air, the surfaces being of polished silver. The second pair were so arranged, that by means of an "aspirator," a current of air was made to pass over the bulbs more rapid than they would be exposed to by the mere vertical motion of the balloon. The object of this arrangement was to

enable the thermometers to assume with more rapidity the temperature of the surrounding air, and also to diminish the effect of radiation, in case the shades should not be a sufficient protection, especially when the balloon was stationary or rising very slowly. The thermometers used were very delicate, the bulbs being cylinders about half an inch long and not more than $\frac{1}{12}$th of an inch diameter. It was found on trial that when the bulbs were heated 20° above the temperature of the air in a room, they resumed their original reading in 40 or 45 seconds, when moved through the air at the rate of 5 or 6 feet in a second. It is thus probable that any error arising from want of sensibility in the thermometers will be small, and in all likelihood not more than may be expected from other accidental causes.

The observations were taken at short intervals during the *ascent*, it having been seldom practicable to obtain a regular series in the *descent*. The intervals were generally one minute, but frequently only 30 seconds, so that an observation was for the most part recorded every 200 or 300 feet. All the observations are given in detail in the tables accompanying the paper. They are also given in the graphical form in the curves.

The ascents took place on August 17, August 26, October 21, and November 10, 1852, from the Vauxhall Gardens, with Mr. C. Green's large balloon.

The principal results of the observations may be briefly stated as follows:—

Each of the four series of observations shows, that the progress of the temperature is *not* regular at all heights, but that at a certain height (varying on different days) the regular diminution becomes arrested, and for the space of about 2000 feet the temperature remains constant or even increases by a small amount: it afterwards resumes its downward course, continuing for the most part to diminish regularly throughout the remainder of the height observed. There is thus, in the curves representing the progression of temperature with height, an appearance of *dislocation*, always in the same direction, but varying in amount from 7° to 12°.

In the first two series, viz. Aug. 17 and 26, this peculiar interruption of the progress of temperature is strikingly coincident with a *large* and *rapid fall* in the temperature of the *dew-point*. The same is exhibited in a less marked manner on Nov. 10. On Oct. 21 a dense cloud existed at a height of about 3000 feet; the temperature decreased uniformly from the earth up to the *lower* surface of the cloud, when a slight rise commenced, the rise continuing through the cloud and to about 600 feet above its upper surface, when the regular descending progression was resumed. At a short distance above the cloud the dew-point fell considerably, but the rate of diminution of temperature does not appear to have been affected in this instance in the same manner as in the other series; the phenomenon so strikingly shown in the other three cases being perhaps modified by the existence of moisture in a *condensed* or vesicular form.

It would appear on the whole that about the principal plane of

condensation heat is developed in the atmosphere, which has the effect of raising the temperature of the higher air above what it would have been had the rate of decrease continued uniformly from the earth upwards.

There are several instances of a second or even a third *sudden* fall in the dew-point, but any corresponding variation in the temperature is not so clearly exhibited, probably owing to the *total* amount of moisture in the air being, at low temperatures, so very small that even a considerable change in its *relative* amount would produce but a small thermal effect.

As the existence of the disturbance in the regular progression of temperature now stated rendered it necessary, in order to arrive at any approximate value of the normal rate of diminution with height, to make abstraction of the portion affected by the disturbing cause, each series was divided into two *sections*, the first comprising the space below the stratum in which the irregularity existed, and the second commencing from the point where the regular diminution of temperature was resumed. It was then found that the rate of diminution was nearly uniform within each *section*, but that it was somewhat greater in the lower than in the upper sections.

On taking a mean of both sections for each series, giving each section a value corresponding to its extent, it is found that the number of feet of height corresponding to a fall of one degree Fahrenheit is—

On August 17	.....	292·0 feet.
August 26	.....	290·7 ,,
October 21	.....	291·4 ,,
November 10	.....	312·0 ,,

The first three values being remarkably coincident, and the last differing from them by about $\frac{1}{15}$th of the whole.

The air collected in the ascents was analysed by Dr. Miller; he states that "the specimens of air do not differ in any important amount from that at the earth at the same time, but contain a trifle less oxygen. All of them contained a trace of carbonic acid, but the quantity was too small for accurate measurement upon the small amount of air collected."

June 2, 1853.

The EARL OF ROSSE, President, in the Chair.

The Annual General Meeting for the Election of Fellows was held.

The Statutes respecting the election of Fellows having been read, Admiral Sir Francis Beaufort, and James Walker, Esq., were, with the consent of the Society, appointed Scrutators to assist the Secretaries in examining the lists.